



Who is FERC and Why Do Bugs Matter?

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Who is FERC?

- Federal Energy Regulatory Commission
- License the operation of hydroelectric facilities
- Licenses are for 30 – 50 years
- About 29 projects are being, or will be, relicensed in the next 10 years (most West Slope Sierra Watersheds, and Klamath River)

Why does the SWRCB care?

- The State Water Resources Control Board has the authority to issue certification under section 401 of the Clean Water Act
- Ensure compliance with State laws for water quality and other
- Mandatory conditioning - 401 conditions must be incorporated in the FERC license

Section 401 of the CWA

- “Any applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates or will originate...that any discharge will comply with the applicable provisions of sections 1311, 1312, 1313, 1316, and 1317 of this title”.

The Clean Water Act

- The Clean Water Act is based on protecting the chemical, physical, and biological integrity of the nations waters
- The Basin Plans contains water quality standards, which are the beneficial uses of waters, and the water quality objectives for protection of the beneficial uses.

Why use Bioassessment?

- Good tool to assess the chemical, physical and biological integrity of water, determine compliance with the Basin Plan
- High level assessment - community level assessment - in California fish will not work
- If using BMI's, and RBA, it is relatively inexpensive

What are the impacts of hydroelectric facilities?

- Affect geomorphology - aggradation or degradation, loss of macroinvertebrate habitat and spawning gravel
- Affect water quality - temperature, DO, primary production, pH
- Prevent passage - both up and downstream
- Entrainment
- Dams alter the transportation and retention of FPOM and CPOM, and trap sediments
- Peaking - daily change in meso and microhabitats
- By-passed channels - reduction in habitat
- Change hydrology - timing and magnitude

Dams Block Passage - of fish, frogs, otters, bugs, etc.



Entrainment



Reservoirs Affect Water Quality



Riparian Habitat, lack of recruitment



Riparian Habitat, encroachment



Riparian Habitat, Encroachment



Reduction of Habitat



Construction Impacts



Construction Impacts



Geomorphic Impacts – aggradation and degradation



Chemical Spill



Peaking Impacts



How do we use bugs to assess impacts of hydro projects?

- Indicator of water quality impairment
- Fish food
- Bioenergetics

Water Quality Impacts

- Rapid Bioassessment – What else? Point source vs. non-point source
- Location, location, location – look at impacts through a reach
- Multivariate analysis – gotta have it
- May need to look at specific species for certain peaking impacts – univoltine vs. bi, tri, or multivoltine
- Need reference sites, or IBI

Fish Food

- Varial zone sampling in peaking reaches with drift nets – food availability in the varial zone
- Drift sampling – behavioral vs. “catastrophic”
- Wetted perimeter
- Standing crop

Bioenergetics

- Use drift sampling as input to a bioenergetics model
- May compliment PHABSIM
- May be used to evaluate peaking impacts



The end?



Or the beginning?